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Before the
FEDERAL COMMUNICATIONS COMMISSION
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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Amendment of Part 15 of the)
Commission's Rules to Permit Operation)
of Biomedical Telemetry Devices on)
VHF TV Channels 7-13 and on)
UHF TV Channels 14-46)

ET Docket No. 95-177

OPPOSITION TO PETITIONS FOR RECONSIDERATION

The Critical Care Telemetry Group ("CCTG") submits the following opposition to the petitions for reconsideration (the "Petitions") filed by the National Association of Broadcasters ("NAB") and the Cellular Phone Taskforce ("CPT") in the above-captioned proceeding.¹

I. OVERVIEW: THE PETITIONS ARE SUBSTANTIVELY AND PROCEDURAL DEFECTIVE.

While addressing different issues, both the NAB and CPT Petitions suffer from similar substantive and procedural defects. Substantively, each Petition seeks to impose higher standards for protection, in one case from interference, and in the other case from RF emissions, than those established and accepted by the Commission for the operation of other services. Neither the NAB nor CPT addresses, much less convincingly explains, why such different and more stringent standards should apply to the use of life-saving biomedical telemetry than apply to television or land mobile transmissions. Each Petition, moreover, raises matters that have been thoroughly considered already by the Commission in this and other proceedings.

Finally, to the extent that each petition may purport to offer "new evidence" for consideration by the Commission in this docket, neither petitioner demonstrates why such new material could not have been previously submitted, under the standards set forth in Section 1.429(b) of the Commission's rules.

¹ Report and Order in ET Docket No. 95-177, FCC No. 97-379, rel. Oct. 20, 1997.

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II. THERE IS NO JUSTIFICATION FOR THE NAB'S PROPOSAL TO USE SEPARATIONS STANDARDS BASED UPON HIGHER D/U LEVEL THRESHOLDS THAN EMPLOYED BY THE COMMISSION TO PROTECT TELEVISION SIGNALS FROM OTHER TELEVISION AND LAND MOBILE SERVICES.

The NAB asks the Commission to establish separation distance requirements for biomedical telemetry based upon a D/U ratio (57 dB) that is much higher than those specified by the Commission to protect broadcast signals from other interfering signals. The attached Engineering Statement of Philip A. Rubin & Associates ("Engineering Statement") explains that the Commission has employed only a 45 dB D/U level for protecting full-power TV stations from low-power television ("LPTV") services, and contrary to the NAB's assertions, a 40 dB D/U ratio for protection from land mobile operations in certain congested markets.

The NAB does not explain why a higher standard of protection is necessary for biomedical telemetry devices. Indeed, as set forth in the Engineering Statement, if anything, a lower standard of protection would be warranted. Unlike LPTV and land mobile transmitters, the interference potential of biomedical telemetry transmitters under normal operating conditions is significantly attenuated by a combination of body and structural shielding and by an antenna height less than the 30 meters used in the Commission's protective assumptions.

Similarly, and again as detailed in the Engineering Statement, the new test data that NAB submits in support of a higher interference protection standard is based upon a level of picture quality that is higher than that employed by the industry or the Commission in establishing television interference protection standards. The data submitted by the NAB was based upon a CCIR level 5, instead of level 3 picture quality. NAB provides no justification for "raising the bar" for only one potential source of interference, biomedical telemetry, for the simple reason that none exists.

III. THE PCT'S CHALLENGES TO THE COMMISSION'S RF RADIATION GUIDELINES HAVE ALREADY BEEN REJECTED BY THE COMMISSION IN THE RELEVANT PROCEEDING AND ARE NOT GERMANE HERE.

As set forth in the attached Engineering Statement, the permitted operation of biomedical telemetry devices, even under a worst case analysis, will be a small fraction of the maximum recommended levels permitted under the Commission's RF radiation

guidelines² and are infinitesimal when compared with other permitted communications devices. CPT does not even argue that emissions of biomedical telemetry devices would exceed the Commission's guidelines. Furthermore, CPT's arguments as to the appropriate general RF radiation standards were considered and rejected by the Commission in its RF Radiation decision released last August.³

Finally, accepting *arguendo* CPT's proposed guidelines, the Engineering Statement demonstrates that even under a predicted worst case, the biomedical telemetry devices at issue would meet those guidelines. Accordingly, by any measure, CPT has presented no radiation hazard issue.

IV. BOTH THE NAB AND THE CPT PETITIONS ARE PROCEDURALLY DEFECTIVE.

Both the NAB and the CPT seek to introduce purported "new evidence" into this proceeding, yet neither justifies its failure previously to submit these materials into this docket, as required under Section 1.429(b) of the Commission's Rules.

In an attempt to buttress its claims, the NAB submits an 18-month old report of the Advanced Television Technology Center. NAB asserts that because this report was completed a few weeks after the reply period in the docket ended, it couldn't have been submitted earlier. Such reports, however, are submitted all the time (by NAB and other groups) in the form of *ex parte* submissions well after formal pleading cycles are closed. Further, if NAB thought that Commission consideration of such a study was required, it had every opportunity to have it completed before the pleading cycle of the initial proceeding was concluded.

As for CPT, in addition to cross-referencing a year-old petition filed in another docket, it relies (by reference) on other materials that appear to be of at least 1996 vintage. If CPT had issues to raise with respect to this proceeding, it had every opportunity to do so earlier.

² Second Memorandum Opinion and Order, 12 FCC Rcd 13494 (1997) ("RF Radiation Decision").

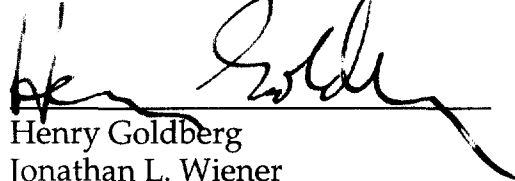
³ RF Radiation Decision, *supra*, at 13501-13508.

CONCLUSION

The Petitions for Reconsideration filed in this Docket offer no sound basis for doing so. CCTG respectfully requests that they be dismissed or denied forthwith.

Respectfully submitted,

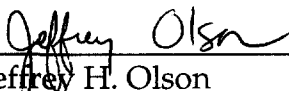
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ENGINEERING STATEMENT

The firm of Philip A. Rubin & Associates, Inc. ("PAR") has been retained by the Critical Care Telemetry Group ("CCTG") to provide on its behalf technical support regarding the recently adopted report and order under ET Docket 95-177 pertaining to the operation of biomedical telemetry devices ("BTDs") on VHF TV channels 7 through 13 and UHF TV channels 14 through 46. Specifically, this engineering statement will provide comments in opposition to the Petition For Partial Reconsideration filed by the National Association of Broadcasters ("NAB") and the Petition For Reconsideration filed by the Cellular Phone Taskforce ("CPT") regarding the recently adopted report and order.

Background

In 1995, CCTG filed a petition for rulemaking with the Commission requesting operation of biomedical telemetry devices with increased power within the designated television broadcast band. Specifically, CCTG proposed that biomedical telemetry devices operate with a maximum output power of 5 milliwatts in the VHF TV band of 174-216 MHz (television channels 7 - 13) and UHF TV band 470 - 806 MHz (television channels 14 - 69).¹ In its petition, CCTG proposed minimum distance separations to protect co-channel VHF and UHF television stations from any harmful interference which may be attributable to the operation of the BTDs. The separation requirement was based on a desired to undesired ("D/U") signal ratio of 45 dB.

On October 20, 1997, the Commission released a Report and Order ("R&O") permitting BTDs to operate on television channels 7 - 13 and 14 - 46 with enhanced radiated power levels such that the signal strength measured at 3 meters from the device would be no greater than 200 mV/m⁽²⁾. In the R&O, the Commission specified that BTDs must

¹ See Notice of Proposed Rule Making, ET Docket No. 95-177, FCC No. 95-488, Released January 25, 1996.

² See Report and Order, ET Docket No. 95-177, FCC No. 97-379, released October 20, 1997.

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be located outside the Grade B contour of co-channel TV broadcast stations by at least 10.3 kilometers for TV channels 7 - 13 and 5.5 kilometers for TV channels 14 - 46. Similarly, biomedical telemetry transmitters must be located outside the protected contours of co-channel low power television ("LPTV") stations by at least 5.1 kilometers on channel 7 through 13 and 3.1 kilometers on channels 14 - 46.

NAB Petition

In its petition to the Commission, NAB proposes that new co-channel separation criteria be established for protecting NTSC television signals from the transmissions of Part 15 biomedical telemetry devices. Specifically, it recommends that in the determination of these separation requirements, a co-channel D/U ratio of 57 dB be used. NAB points an ATTC ("Advanced Television Technology Center") study showing the threshold of interference corresponding to a D/U level of 56.99 dB. NAB also comments that the Commission's protection requirements, as specified in the R&O, are less protective of nearby co-channel television stations than those specified for land mobile stations, where the minimum D/U ratio is 50 dB.

In response to NAB's comments, CCTG believes that separation requirements specified in the R&O are adequate. The ATTC data referred to by NAB, does indeed show that the threshold of visibility of interference due to noise occurs at a D/U level of 56.99 dB. The fact that needs to be emphasized, however, is that this threshold of visibility is not the same criteria the FCC has used to define an acceptable television picture.

As has been detailed in CCTG's previous filings, the current NTSC to NTSC acceptable interference (i.e. D/U) levels were based on subjective viewing tests conducted in the early 1960's by the Television Allocation Study Organization ("TASO"). In determining the applicable D/U ratios, the Commission used TASO's 6 level picture rating system. Level 3 was used as the baseline by the Commission and corresponds to the subjective determination that the

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NTSC picture is of acceptable quality and interference is not objectionable. In conducting subjective picture quality tests on the Advanced Television (as well as NTSC) system, the 5 level CCIR grading scale was employed. A CCIR rating of 3, which corresponds to slightly annoying picture approximates the TASO grade 3 rating. Both ATTC and the Commission have used the CCIR level 3 rating to establish allowable interference with NTSC pictures.

During the ATV bench tests and the field tests in Charlottesville, North Carolina, ATTC used the CCIR level 3 rating as the baseline^{3,4}. In its Final Technical Report⁵, the ATTC specified minimum D/U ratios required to maintain a CCIR level 3 NTSC picture with a DTV signal as the interferer. The Commission in its Sixth Report and Order, MM Docket No. 87-268 (FCC No. 97-115), used these D/U ratios to generate a DTV allotment table for each existing NTSC station.

The ATTC data that NAB refers to in its petition does not provide the interfering noise levels at which a CCIR level 3 picture is attained. Only data pertaining to noise levels at which interference is just barely visible is given. For three data points, however, the ATTC data provides interference levels corresponding to CCIR level 4 picture quality, which is one level of picture quality better than CCIR level 3. This limited data, contrary to NAB assertions, shows that at D/U levels of 38.91 dB, a CCIR level 4 quality picture is achievable. This is much less than the 45 dB level used by CCTG in its proposal, which yielded a slightly more stringent separation requirement than specified by the Commission in its R&O. The limited test data suggests that CCIR level 3 picture quality is achievable with D/U levels below 38.91 dB.

The 57 D/U level that NAB proposes, would correspond to an NTSC picture quality higher than CCIR level 3. However, as mentioned

³ See Digital Grand Alliance System, Record of Test Results", Advanced Television Test Center, Inc., Cable Television Laboratories, Inc., Advanced Television Evaluation Laboratory, CRC, Task Forces on digital Specific Tests, Audio & Field Tests, Association For Maximum Service Television, Public Broadcasting Service, Hitachi America, Ltd., IBM, October 1995, Part VII, pages 8 and 10.

⁴ See "ATV System Recommendation", Federal Communications Commission Advisory Committee on Advanced Television Service, page 8-2, February 24, 1993.

⁵ See "Final Technical Report", Advisory Committee on Advanced Television Service, pp. 15, October 31, 1995.

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above, this runs counter to the Commission's baseline that is applied to existing NTSC service and that which was used to generate the DTV allocation tables. Hence, NAB's proposal is inconsistent with the Commission's own criteria as to what an acceptable NTSC picture is, and it would force a different and much more stringent protection standard on BTM operation than is applicable to much higher power services such as LPTVs, LPAS and the new DTV stations.

It should be noted that in deriving the minimum separation requirements to nearby television stations, the Commission did not rely on BTM signals being attenuated by the human body or the walls of the healthcare facility⁶. Hence, the Commission's required separation criteria corresponds to a worst case condition regarding the operation of biomedical telemetry transmitters. In all likelihood, a BTM's transmitted signal will be attenuated further by the above mentioned "obstructions" and thus provide additional protection to nearby TV stations.

With reference to the 50 dB D/U level used by the Commission in the land mobile service, NAB neglects to mention that in the congested markets of New York and Cleveland, the Commission employs a D/U level of 40 dB to protect television stations operating on a co-channel basis with land mobile stations⁷. A 1983 report published by the FCC's Office of Science and Technology, states that the 50 dB D/U ratio used by the Commission was based on empirical data collected in the early 1960's and a number of non-technical considerations⁸. The report goes on to say that, at the time of its writing, there was evidence that a D/U ratio of 40 dB would provide adequate protection to television stations from land mobile facilities⁹. It also notes a lack of interservice interference in New York where the 40 dB D/U ratio is used to protect television stations from co-channel land mobile stations¹⁰.

⁶ See Report and Order, ET Docket No. 95-177, FCC No. 97-379, released October 20, 1997, paragraph 26.

⁷ See 47 CFR Section 90.307 and 90.309.

⁸ Tawil, V., Kalagian, G., Eckert, R., "Analysis of Technical Possibilities For Further Sharing Of The UHF Television Band By The Land Mobile Services In The Top Ten Land Mobile Markets", OST Report FCC/OST R-83-3, October 1983, page 7.

⁹ Ibid.

¹⁰ Ibid.

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As further evidence that the NAB proposed D/U level are overly restrictive, one can refer to the current LPTV rules. As specified in section 74.705(d)(1), a D/U level of 45 dB is required to protect a full service TV station from a co-channel LPTV station. The existing operation of these two television services provides real time data and proof as to the efficacy and adequacy of the aforementioned protection criteria.

Lastly, it should be remembered that Low Power Auxiliary Stations ("LPAS") are permitted to operate on television broadcast frequencies with far higher power levels than BTDS as specified in the R&O. As has been noted by CCTG in its previous filings, the operation of LPAS on television frequencies, has not led to any increased interference to the reception of nearby television stations.

In summary, CCTG believes that the current separation requirements specified in the Commission's R&O are sufficient to protect nearby television stations from interference which may result from the operation co-channel biomedical telemetry transmitters. The NAB proposed co-channel D/U signal ratios are overly restrictive. Furthermore, the data used by NAB to support its argument does not show that the current requirements as specified in the R&O are inadequate and would lead to excessive levels of interference to the reception of TV signals. In fact, the data actually supports the Commission's own position.

CPT Petition

In its Petition For Reconsideration, CPT states that the enhanced operation of biomedical telemetry devices as specified in the Commission's R&O would discriminate against approximately 2% of the U.S. population who are electrically sensitive. In its petition, CPT claims that the radiofrequency guidelines released by the FCC's Office of Engineering and Technology¹¹ are inadequate. As such, CPT states

¹¹ "Evaluating compliance with FCC guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", OET Bulletin 65 (Edition 97-01), Published by FCC's Office of Engineering and Technology.

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that newly enhanced BTM signal strength of 200 mV/m at 3 meters, which has been specified in the Commission's R&O, would surpass the 10 microwatt per square centimeter limit that it recommends as the correct limit for all radiators operating on frequencies of 100 MHz and above¹².

In response, CCTG believes that CPTs objections are beyond the scope of these proceedings. Specifically, CPT has a fundamental difference of opinion with the Commission regarding the maximum levels to which humans may be exposed to non-ionizing radiation. The signal levels contained in the R&O are consistent with the newly adopted protection guidelines as contained in OET Bulletin 65, Edition 97-01, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency electromagnetic Fields", August 1997.

As an exercise to determine how close the new BTM transmission requirement are to meeting the CPT proposed radiation limits, an analysis of the predicted power density level of a theoretical biomedical telemetry device generating a signal level of 200 mV/m at 3 meters was performed. The power density limits were calculated at distances of 20 centimeter and 300 centimeters from the device using the methodology contained in Bulletin 65. The 20 centimeter distance corresponds to the distance that the OET, in its bulletin 65, has used to distinguish between a mobile and portable device. Specifically, a mobile devices are defined, under Bulletin 65, as "transmitters designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons."¹³

It should be noted, however, that a biomedical telemetry device is normally attached to a patient and, thus, according to Bulletin 65 would

¹² Petition For Reconsideration, ET Docket No. 93-62 and FCC Report and Order, FCC 96-326, submitted by Cellular Phone Taskforce, August 30, 1996, page 2.

¹³ Evaluating Compliance with FCC Guidelines For Human Exposure To Radiofrequency Electromagnetic Fields", OET Bulletin 65, edition 97-01, August 1997, Appendix A.

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fall under the classification of a portable device, whereby compliance is measured in terms of specific absorption rate ("SAR"). Nevertheless, the calculations below are useful in showing the radiation levels to which the general public would be exposed to by biomedical telemetry transmissions.

To begin, the effective radiated power ("ERP") that must be transmitted by a device to produce a signal level of 200 mV/m may be determined using the formula below :

$$E = \frac{\sqrt{(30)(ERP)(1.64)}}{d} \quad (\text{see footnote 14})$$

where :

E : Field Strength (Volts/meter)
 ERP : Effective Radiated Power Relative To A Dipole Antenna (Watts)
 d : Distance (meters)

The above equation above may be rearranged to solve for ERP as shown below :

$$ERP = \frac{(E)^2(d)^2}{(30)(1.64)}$$

Substituting for "E" a value of 200 mV/m (or 0.2 V/m) and for "d" a value of 3 meters, the corresponding maximum effective radiated power that a biomedical telemetry transmitter would produce would be

$$ERP = \frac{(0.2\text{Volts / meter})^2(3\text{meters})^2}{(30)(1.64)} = 7.3\text{mWatts}$$

¹⁴ "Engineering Handbook, seventh edition", National Association of Broadcasters (1985), p. 2.9-238, equation 9.

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From OET Bulletin 65, the equation for power density generated by a radiating device is as follows :

$$S = \frac{(2)^2 (1.64)(ERP)}{4\pi R^2}$$

where :

- S : Power Density (Watts/meter²)
 ERP : Effective Radiated Power Relative To A Dipole Antenna (Watts)
 R : Distance (meters)

It should be noted that the above equation describes a worst case condition, since it assumes that there is 100% reflection of the incoming radiation at the surface resulting in a potential doubling of predicted field strength and four fold increase in the far field equivalent power density.

Using the above equation, the predicted worst case power density level can be calculated at 20 centimeters and 3 meters from a biomedical telemetry transmitter operating with an ERP of 7.3 milliwatts. The predicted power density values at these two distances are as follows :

$$S_{20centimeters} = \frac{(2)^2 (1.64)(7.3mW)}{4\pi(20cm)^2} = .009527mW / cm^2$$

where

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$S_{20centimeters}$: Power density level at a distance of 20 centimeters from a biomedical telemetry transmitter (mWatts/centimeter²) - assumed single linear polarization

and

$$S_{3meters} = \frac{(2)^2 (1.64)(7.3mW)}{4\pi(300cm)^2} = 0.0000423423mW / cm^2$$

where

$S_{3meters}$: Power density level at a distance of 3 meters from a biomedical telemetry transmitter (mWatts/centimeter²) - assumed single linear polarization.

According to OET Bulletin 65, the recommended maximum power density levels that the general public may be exposed to within the frequency range of 30 to 300 MHz over a 30 minute period is 0.2 milliWatts/centimeter². In the frequency range of 300 to 1500 MHz, the recommended limit is directly proportional to the operating frequency and ranges from 0.2 to 1.0 miliwatts/centimeter², with the former value corresponding to the frequency of 300 MHz and the latter value corresponding to the frequency of 1500 MHz.

For simplicity, the analysis uses a worst case limit of 0.2 miliwatts/centimeter² to be applicable to BTDS operating on frequencies 174-216 MHz (TV channels 7 through 13) and 470-668 MHz (TV channels 14-46). With this assumption, the predicted worst case power density levels at 20 centimeters and at 3 meters from a BTDS are 4.76% and 0.02% of the FCC's maximum recommended limit, respectively.

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As mentioned earlier, however, CPT recommends a maximum power density level of 10 microwatts/centimeter² (or 0.01 milliwatts/centimeter²). Accordingly, the predicted worst case power density levels at 20 centimeters and 3 meters from a BTD device operating with a maximum effective radiated power of 7.3 milliwatts would be approximately 92.57% and 0.42% of the maximum levels recommended by CPT and, hence, would meet this group's own recommended radiation limits.

For comparative purposes, the predicted power density levels generated by a biomedical telemetry device operating with a maximum ERP of 7.3 milliwatts was compared to a cellular system's mobile transmitter unit. Under Part 22, Subpart K of the FCC rules and regulations, such a unit may operate in the frequency range of approximately 824 to 847 MHz¹⁵ with a maximum ERP of 7 watts¹⁶. Using the above formulas, the predicted worst case power density levels for this type of cellular unit was calculated for distances of 20 centimeters and 3 meters and compared to those calculated for BTDs. The table below lists the results.

	<u>Mobile Cellular Unit</u>	<u>BTD</u>
Frequency of Operation (MHz)	824-847	174-668
Maximum ERP (Watts)	7	0.0073
Polarization	Linear	Linear
Predicted Power Density Level At 20 centimeters From Device (mW/cm ²)	9.1355	0.009527
Predicted Power Density Level At 3 meters From Device (mW/cm ²)	0.0406	0.000042

¹⁵ See 47 CFR, section 22.902.

¹⁶ See 47 CFR, section 22.904.

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In summary, the worst case predicted power density levels to which the general public would be exposed to are far below the maximum limits required by the Commission, as specified in OET Bulletin 65. Moreover, the worst case power density levels produced by these devices also satisfy the radiation limits recommended by the Cellular Phone Taskforce. Accordingly, the operation of biomedical telemetry devices operating under the conditions specified by the Commission in ET docket 95-177 is not predicted to expose the general population to hazardous radiation levels.

February 4, 1998



Abdolmajid Khalilzadeh

CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing Opposition to Petitions for Reconsideration were sent by hand and first-class mail, postage prepaid, this 5th day of February, 1998, to each of the following:

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